Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Bachelor Thesis

Investment in Blockchain Technologies: Comparative Analysis of Ethereum and Polkadot

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

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Business Administration

Thesis title

Blockchain Investments

Objectives of thesis

The main goal of the work is to analyze investments in blockchain, from its origins to modern developments in this area, analyze profitability, risks and compare investments in blockchain with more traditional investment tools. Understand the rise and fall of popular blockchain projects. Analyze investments in cryptocurrency, NFT, DeFi, ICO & IDO and Staking. To identify trends and try to discover the vector of development of this technology, to consider the possibilities of investing in the metaverses.

Methodology

The work will be divided into two parts, theoretical and practical.

The theoretical part will include reasoning and conclusions based on literature, scientific articles and opinions of authoritative representatives of this field. It will include the history of the blockchain, the history of its development, the reasons for its popularity and the future prospects of this technology.

In the practical part, the investment activity in the blockchain in the past and present will be analyzed, the performance will be compared with more traditional investments, different directions of investments in the blockchain will be compared, risk assessment. Comparison of the rise and fall of major cryptocurrencies and altcoins.

The proposed extent of the thesis

40 pages

Keywords

blockchain, cryptocurrency, investment, metaverse

Recommended information sources

The Truth Machine: The Blockchain and the Future of Everything (Michael J. Casey); The Bitcoin Standard: The Decentralized Alternative to Central Banking (Saifedean Ammous); Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World (Don & Alex Tapscott); Inventing Bitcoin: The Technology Behind The First Truly Scarce and Decentralized Money Explained (Yan Pritzker)

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Declaration

I declare that I have worked on my bachelor thesis titled "Investment in Blockchain Technologies: Comparative Analysis of Ethereum and Polkadot" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15.03.2023 _____

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Investment in Blockchain Technologies: Comparative Analysis of Ethereum and Polkadot

Abstract

The main goal of this bachelor thesis lies in conducting a comparative analysis of cryptocurrencies and stocks of companies specializing in the technological domain. The author's selection of the tech domain is justified by the fact that tech stocks present an alternative to cryptocurrencies and vice versa, so the author is genuinely interested in understanding which kind of investment is better in terms of profitability and risk. For the analysis, the author selects 2 cryptocurrencies based on the blockchain technology – Ethereum and Polkadot, and 2 stocks of companies specializing in the IT or technological segment – Amazon and Google. For the methodology of the author's work, he selects the quantitative approach, where his analysis is purely based on empirical research according to the series of fundamental indicators selected by him. The author uses Yahoo finance dataset for the extraction of data, where he bases his analysis on monthly time series data representing the time interval from 01.04.2022 to 04.03.2023 since the author is considering the short-term horizon for the investment. To conclude, the author is able to highlight that when comparing potential investments to crypto currencies and stocks, the author, based on the example of the comparative analysis of Polkadot/Ethereum coins and Google/Amazon stocks is able to say that the second option is more preferred due to lower volatility and higher predictability of the market. At the same time, the author believes that the current financial situation is rather complicated and there are almost no ways for investors to maximize their gains in the short-term perspective by investing into major enterprises' stocks in 2023.

Keywords: blockchain, cryptocurrency, investment, metaverse

Investice do blockchainových technologií: srovnávací analýza Ethereum a Polkadot

Abstrakt

Hlavním cílem této bakalářské práce je provedení srovnávací analýzy kryptoměn a akcií společností specializujících se na technologickou oblast. Autorův výběr technologické domény je odůvodněn skutečností, že technologické akcie představují alternativu ke kryptoměnám a naopak, takže autor má skutečný zájem pochopit, který druh investice je lepší z hlediska ziskovosti a rizika. Pro analýzu autor vybere 2 kryptoměny založené na technologii blockchain – Ethereum a Polkadot a 2 akcie společností specializujících se na IT nebo technologický segment – Amazon a Google. Pro metodologii autorovy práce volí kvantitativní přístup, kde je jeho analýza čistě založena na empirickém výzkumu podle řady jím vybraných základních ukazatelů. Autor používá Yahoo finance dataset pro extrakci dat, kde svou analýzu zakládá na měsíčních datech časových řad představujících časový interval od 01.04.2022 do 04.03.2023, protože autor zvažuje krátkodobý horizont investice. Na závěr je autor schopen zdůraznit, že při porovnávání potenciálních investic s kryptoměnami a akciemi je autor na základě příkladu srovnávací analýzy mincí Polkadot/Ethereum a akcií Google/Amazon schopen říci, že druhá možnost je výhodnější kvůli nižší volatilitě a vyšší předvídatelnosti trhu. Autor se zároveň domnívá, že současná finanční situace je poměrně komplikovaná a téměř neexistují způsoby, jak by investoři mohli maximalizovat své zisky v krátkodobé perspektivě investováním do akcií velkých podniků v roce 2023.

Klíčová slova: blockchain, kryptoměna, investice, metaverse

Table of contents

List of pictures

List of tables

List of abbreviations

DOT	Polkadot
ETH	Ethereum
GOOGL	Google Stock
AMZN	Amazon Stock
USD	United States Dollar

1 Introduction

The ever-increasing popularity of cryptocurrencies and stocks of companies operating in the technological domain has triggered a surge in investor interest, compelling individuals to investigate the profitability and risk associated with these investments. The fundamental appeal of technology stocks lies in their potential for long-term capital appreciation, while cryptocurrencies are seen as a diversifying asset that may offer an opportunity to earn quick returns. Consequently, the need to compare these two classes of investments and determine which one presents the most attractive option in terms of profitability and risk has become crucial.

To this end, this bachelor thesis aims to conduct a comparative analysis of cryptocurrencies and stocks of companies operating in the technological domain. The selected tech domain is justified by the fact that tech stocks and cryptocurrencies can offer viable alternatives to one another, making it necessary to understand which type of investment presents a superior option. Specifically, the analysis focuses on two cryptocurrencies based on blockchain technology, namely Ethereum and Polkadot, and two stocks of companies specializing in the IT or technological segment, namely Amazon and Google.

The author adopts a quantitative approach, relying on empirical research to evaluate the investment options' performance. The practical component of the research consists of three distinct analyses based on a series of fundamental indicators selected by the author.

The first analysis, trend analysis, seeks to estimate a trend that describes the selected asset's price development over time. This estimation enables the author to develop a prognosis for the nearest future based on a given asset's recent performance. The second analysis, volatility analysis, uses standard deviation and coefficient of variation formulas to assess the level of volatility inherent in each investment option. The third analysis is correlation analysis, which examines the relationship between the selected assets' prices. The Pearson correlation coefficient is employed to evaluate the correlation coefficients for each pair, and the t-value test is conducted to assess the significance of the correlation coefficients.

The remainder of this thesis is structured to provide a detailed account of the findings obtained through the application of the above methodology. By the end, it is hoped that this thesis will offer valuable insights to investors seeking to optimize their investment portfolios and allocate resources more efficiently.

2 Objectives and Methodology

2.1 Objectives

The main goal of this bachelor thesis lies in conducting a comparative analysis of cryptocurrencies and stocks of companies specializing in the technological domain. The author's selection of the tech domain is justified by the fact that tech stocks present an alternative to cryptocurrencies and vice versa, so the author is genuinely interested in understanding which kind of investment is better in terms of profitability and risk. For the analysis, the author selects 2 cryptocurrencies based on the blockchain technology – Ethereum and Polkadot, and 2 stocks of companies specializing in the IT or technological segment – Amazon and Google.

2.2 Methodology

For the methodology of the author's work, he selects the quantitative approach, where his analysis is purely based on empirical research according to the series of fundamental indicators selected by him. The practical part is mainly split into three smaller components, each representing a particular kind of analysis selected by the author. The author uses Yahoo finance dataset for the extraction of data, where he bases his analysis on monthly time series data representing the time interval from 01.04.2022 to 04.03.2023 since the author is considering the short-term horizon for the investment.

Trend analysis is based on the estimation of a trend that will describe the development of the price of a selected asset over time and this trend will also help the author to create a prognosis for the nearest future based on the recent performance of a given asset. The following trend will be estimated by the author:

$$y = ax + b \tag{1}$$

The second kind of analysis implemented by the author is the analysis of volatility and for this kind of analysis, the author uses two main formulas: standard deviation and coefficient of variation, that is derived from the standard deviation. The standard deviation measure is calculated according to the following formula:

$$Standard\ Deviation = \sqrt{\frac{\sum(X_i - \bar{X})^2}{n}} \qquad (2)$$

$$Coefficient\ of\ Variation = \frac{s}{\bar{X}} \qquad (3)$$

In addition to the trend and volatility analyses, the author also implements correlation analysis, which is primarily based on the Pearson correlation coefficient used for continuous variables. The calculation of the Pearson correlation coefficient is based on the following formula:

$$r = \frac{\sum(x_i - \bar{x})(y - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}} \qquad (4)$$

After estimating the correlation coefficients for each pair, the author also conducts the test of significance for correlation coefficients, which is based on the computation of t-value. T value for the correlation coefficient is calculated as follows:

$$t\ value = \frac{r_{xy}\sqrt{n-2}}{\sqrt{1-r^2}} \qquad (5)$$

3 Literature Review

The theoretical component of this thesis provides a comprehensive overview of the history and development of blockchain technology, its underlying principles, and its potential applications. This component aims to establish a clear understanding of the fundamental principles of blockchain technology and the factors that have contributed to its rise in popularity in recent years. The following chapters will examine the historical evolution of blockchain technology, its key features, and the various use cases and applications that have emerged in recent years. Furthermore, this component will investigate the factors contributing to the growth of blockchain technology, including the emergence of decentralized finance (DeFi), the increasing popularity of cryptocurrencies, and the development of non-fungible tokens (NFTs). The theoretical component of this thesis will also provide a comprehensive overview of the limitations and challenges of blockchain technology, including scalability issues, regulatory challenges, and the potential risks associated with investing in blockchain projects. Overall, the theoretical component of this thesis aims to establish a clear and comprehensive understanding of blockchain technology and its potential applications, limitations, and challenges, (Phillip, 2018).

3.1 Evolution and Development of Blockchain Technology

3.1.1 Origins of Blockchain

The origins of blockchain technology can be traced back to the early 1990s, when researchers began exploring the concept of using cryptography to secure digital transactions. One of the earliest examples of this was the work of Stuart Haber and W. Scott Stornetta, who proposed a method for using a digital timestamp to create a tamper-proof log of documents. This method, known as the "Merkle Tree," allowed for the creation of a secure, verifiable chain of data .

However, it was not until the emergence of Bitcoin in 2009 that blockchain technology began to gain widespread attention. Bitcoin's creator, known under the pseudonym Satoshi Nakamoto, introduced a decentralized, peer-to-peer electronic cash system that used blockchain technology to record transactions on a public ledger. This allowed for a secure and transparent way of exchanging value without the need for intermediaries such as banks or financial institutions (Akhmatov, 2020).

Since then, blockchain technology has continued to evolve and expand beyond its original application in cryptocurrencies. The development of Ethereum in 2015, with its support for smart contracts and decentralized applications (dApps), opened up new possibilities for blockchain-based systems in a wide range of industries. Today, blockchain technology is being explored for use cases ranging from healthcare and supply chain management to voting systems and social media. The evolution of blockchain technology has been marked by a series of technical innovations and improvements. These include the development of consensus algorithms, such as proof-of-work (PoW) and proof-of-stake (PoS), which are used to secure the blockchain network and validate transactions. Other innovations include the use of sidechains, which allow for the creation of separate blockchains that can interact with the main chain, and the development of scaling solutions such as sharding and off-chain channels. Overall, the origins and development of blockchain technology have been marked by a series of technological advancements and innovations, as well as a growing recognition of the potential applications of blockchain systems in a wide range of industries. Understanding the history and evolution of blockchain technology is crucial for gaining insights into its current and future potential, as well as for analyzing the investment opportunities and risks associated with this rapidly evolving field (Arikan, 2020).

3.1.2 Essence

Blockchain technology is a distributed and decentralized digital ledger that enables secure and transparent transactions without the need for intermediaries. Blockchain technology has evolved and expanded beyond the realm of cryptocurrencies, and has been explored for use in various industries, including finance, healthcare, supply chain management, and more. At its core, a blockchain is a decentralized database that stores transactional data in a tamper-proof manner. The database is maintained by a network of nodes that validate transactions and record them in a shared ledger. Each node in the network has a copy of the ledger, and all nodes work together to ensure the integrity and consistency of the ledger. Transactions are verified through consensus algorithms, which require a majority of nodes to agree on the validity of a transaction before it can be recorded on the blockchain. One of the key features of blockchain technology is its immutability, which means that once a transaction is recorded on the blockchain, it cannot be altered or deleted. This makes it an ideal technology for applications that require secure and transparent data

storage, such as financial transactions and supply chain management. Another feature that makes blockchain unique is its transparency, as all participants in the network can view the transactional data, which promotes accountability and trust (Navamani, 2023).

There are several different types of blockchain systems, including public, private, and hybrid blockchains. Public blockchains, such as Bitcoin and Ethereum, are open to anyone and do not require permission to participate in the network. Private blockchains, on the other hand, are restricted to a specific group of participants and require permission to join the network. Hybrid blockchains combine elements of both public and private blockchains, and are designed to balance the benefits of decentralization and permissioned access. In addition to these types, there are also several variations of blockchain technology, including permissioned, permissionless, and federated blockchains. Permissioned blockchains restrict participation to authorized users, while permissionless blockchains are open to anyone. Federated blockchains are a hybrid of both, where participation is restricted to a group of trusted nodes.Overall, blockchain technology represents a significant shift in the way that transactions are processed and recorded, offering benefits such as increased transparency, security, and efficiency. As such, it has the potential to transform a wide range of industries and enable new business models and applications (Nica, 2022).

3.1.3   Application of the Technology

Blockchain technology has a wide range of potential applications across various industries. One of the most well-known applications of blockchain technology is in the area of cryptocurrencies, such as Bitcoin, which utilize blockchain as a decentralized and secure means of recording transactions. Beyond cryptocurrencies, blockchain technology has potential use cases in financial services, healthcare, supply chain management, and more. In the financial services industry, blockchain technology has been explored as a means of facilitating secure and efficient transactions, reducing the need for intermediaries, and improving transparency. Blockchain-based platforms can enable faster and more secure settlement of transactions, reduce the potential for fraud, and streamline compliance processes (Yil-Huumo, 2016).

In the healthcare industry, blockchain technology has potential applications in areas such as electronic health records, clinical trials, and supply chain management. The

decentralized nature of blockchain technology can help to ensure the security and privacy of patient data, while also improving the efficiency of healthcare delivery. In supply chain management, blockchain technology can be used to create a transparent and secure record of the movement of goods and products, reducing the potential for fraud and improving efficiency. By enabling real-time tracking and authentication of products at each stage of the supply chain, blockchain technology can improve traceability and accountability, and help to reduce costs. Overall, the potential use cases of blockchain technology are diverse and varied, and are likely to continue to evolve and expand as the technology develops. While some applications of blockchain technology are still in the early stages of development, the technology has already shown promise in a range of industries, and is likely to continue to play an increasingly important role in the digital economy (Till, 2017).

3.1.4 Blockchain Ecosystem

Blockchain technology has emerged as a complex ecosystem involving various stakeholders, each playing a crucial role in ensuring the effective functioning of the system. The blockchain ecosystem comprises of developers, miners, investors, and regulators, among others.Developers play a critical role in the blockchain ecosystem as they are responsible for designing, building, and maintaining blockchain-based applications and systems. Blockchain developers need to have a strong understanding of computer programming languages, cryptography, and distributed systems to create blockchain networks that are secure, efficient, and scalable. In the early days of blockchain, most developers were working on Bitcoin and its underlying blockchain technology. However, as the blockchain ecosystem has evolved and new blockchain platforms have emerged, developers have become increasingly specialized in specific blockchain technologies. For example, some developers may specialize in Ethereum and its smart contract programming language Solidity, while others may work on building decentralized applications (dApps) on top of the EOS blockchain (Choo, 2020).

Moreover, as blockchain technology has gained more widespread adoption, the demand for skilled blockchain developers has increased significantly. Many businesses and organizations are looking to implement blockchain-based solutions to improve their operations, which has resulted in a shortage of experienced blockchain developers in the job

market. To address this issue, universities and educational institutions have started offering courses and programs on blockchain technology to equip future developers with the necessary skills and knowledge to work in the industry. Finally, developers in the blockchain ecosystem also play an important role in the governance and decision-making processes of their respective blockchain platforms. This is particularly evident in open source blockchain projects where developers can propose and vote on changes to the network's code and protocols through a decentralized governance model. As such, developers have a significant impact on the direction and development of the blockchain ecosystem as a whole (Mukhopadhyay, 2016).

Miners are an important stakeholder in the blockchain ecosystem, responsible for creating new blocks and adding them to the blockchain network. Mining is the process by which a new block is added to the blockchain through solving complex mathematical algorithms, which require significant computational power. In order to incentivize miners to participate in the network and to maintain the security of the blockchain, they are rewarded with cryptocurrency for every new block they add. Miners are typically individuals or organizations with access to significant computing resources and specialized hardware designed for mining cryptocurrencies. The competition between miners to solve mathematical problems and add new blocks to the blockchain network is intense, as the reward for doing so can be substantial. Mining is an important aspect of the blockchain ecosystem, as it ensures the security and decentralization of the network. The more miners there are participating in the network, the more difficult it becomes for any one individual or organization to control the network or alter the transaction history. However, the high energy consumption associated with mining has led to concerns about its environmental impact and sustainability (Konoth, 2018).

Investors are another important group of stakeholders in the blockchain ecosystem. Investors are interested in investing in blockchain projects, including blockchain-based startups and Initial Coin Offerings (ICOs), to gain financial returns. They invest in blockchain projects that show potential for growth and profitability, based on factors such as the strength of the team, the quality of the technology, and the potential market demand for the product or service being developed. Investors may also provide funding for blockchain development through venture capital firms or other investment vehicles. They

may also invest in cryptocurrency assets such as Bitcoin, Ethereum, or other tokens, with the hope of profiting from their price appreciation. Investors play a significant role in shaping the direction of the blockchain ecosystem by determining which projects receive funding and support. Their decisions can impact the development of blockchain technology, as well as the adoption and acceptance of blockchain-based products and services. As such, it is important for investors to conduct thorough due diligence before investing in any blockchain project to mitigate potential risks and maximize their returns (Chuen, 2017).

Regulators are an important stakeholder in the blockchain ecosystem, responsible for ensuring that the technology is used in a lawful and ethical manner. They play a critical role in establishing the legal and regulatory frameworks that govern blockchain-based activities, and in monitoring compliance with these regulations. The involvement of regulators in the blockchain ecosystem has been complex and evolving. Initially, many regulators were skeptical of blockchain technology, viewing it as a tool for illegal activities such as money laundering and tax evasion. However, as technology has matured and its potential benefits have become clearer, many regulators have become more open to its use and have taken steps to create regulatory frameworks that support its development. Regulators have several different roles in the blockchain ecosystem. They are responsible for monitoring compliance with relevant laws and regulations, and for taking enforcement action when necessary. They also have a role in protecting consumers and investors, by ensuring that blockchain-based products and services are transparent, fair, and secure. One of the key challenges facing regulators in the blockchain ecosystem is the need to balance innovation with regulation. On the one hand, regulators must ensure that the technology is being used in a safe and responsible manner. On the other hand, they must avoid stifling innovation by imposing overly burdensome regulations that could hamper the development of technology. In order to address these challenges, regulators are increasingly collaborating with other stakeholders in the blockchain ecosystem, including developers, investors, and industry groups. This collaboration is helping to ensure that regulatory frameworks are more effective and more responsive to the needs of industry. Overall, the involvement of regulators in the blockchain ecosystem is crucial to ensuring that the technology is used in a responsible and ethical manner. By working collaboratively with other stakeholders, regulators can help to create a regulatory environment that supports the development of the technology while protecting consumers and investors (Feinstein, 2021).

3.2 Investment in Blockchain

3.2.1 Landscape

Blockchain technology has emerged as a promising and rapidly growing field, which has attracted substantial investment and attention from a diverse range of investors. Blockchain investment landscape is characterized by its dynamic nature, with various investors continuously exploring the market and investing in new opportunities. In this context, it is important to provide an overview of the blockchain investment landscape, including the size of the market, the types of investors, and the investment vehicles available. The blockchain investment market has grown significantly in recent years, with total investments in the blockchain industry exceeding billions of dollars. The market is expected to continue its upward trend, driven by the potential benefits of blockchain technology, including increased efficiency, transparency, and security. The market is also marked by its diversity, with different types of investors, ranging from traditional institutional investors, venture capitalists, hedge funds, to individual investors, participating in blockchain investments (Narayanan, 2016).

The blockchain investment landscape is characterized by a variety of investment vehicles, including initial coin offerings (ICO), security token offerings (STO), venture capital funds, and cryptocurrency funds. ICOs are a popular investment vehicle in the blockchain market, where startups can raise capital by issuing new cryptocurrency tokens. STOs are similar to ICOs, but the tokens issued are classified as securities and are subject to regulatory compliance. Venture capital funds and cryptocurrency funds invest in blockchain startups and cryptocurrencies, respectively. In summary, the blockchain investment landscape is marked by its dynamic and diverse nature, with various investors and investment vehicles driving the market's growth. It is important to understand the characteristics of the blockchain investment landscape, including the size of the market, the types of investors, and the investment vehicles available, to make informed investment decisions in the blockchain market (Baliga, 2016).

3.2.2 Traditional vs. Blockchain Investments

In recent years, blockchain technology has emerged as a novel asset class that has attracted the attention of both traditional and alternative investors. Traditional investments, such as stocks, bonds, and commodities, have been the cornerstone of investment portfolios for many years. These investments are typically bought and sold on centralized exchanges, such as the New York Stock Exchange (NYSE) and the London Stock Exchange (LSE), and are regulated by government agencies. On the other hand, blockchain investments are decentralized and operate on a distributed ledger technology (DLT) platform. These investments include cryptocurrencies, utility tokens, security tokens, and non-fungible tokens (NFTs). They are traded on decentralized exchanges (DEXs) and are not subject to the same regulatory oversight as traditional investments (Bansal, 2019).

When comparing traditional investments with blockchain investments, one of the main advantages of blockchain investments is their decentralization. Blockchain investments are not subject to the same central authority as traditional investments, which can make them more resistant to censorship and political interference. Additionally, blockchain investments can provide greater transparency, immutability, and security, which can enhance trust between investors and issuers. However, blockchain investments also come with a number of disadvantages. For one, they can be highly volatile and speculative, with significant price fluctuations occurring in short periods of time. Moreover, blockchain investments are often associated with a higher level of risk due to the lack of regulation and oversight. This can make them unsuitable for some investors who prefer to invest in more traditional, regulated assets. Overall, while blockchain investments have the potential to offer many benefits, investors should carefully consider their risk tolerance and investment objectives before investing in this emerging asset class. As the blockchain investment landscape continues to evolve, it will be important for investors to stay informed about the risks and opportunities associated with blockchain investments (Carpentier, 2010).

3.2.3 Investment Strategies

Blockchain investment strategies can vary widely depending on the investor's goals, risk tolerance, and investment horizon. Some investors may choose to hold their investments in blockchain technology for the long-term, while others may prefer to engage in short-term

trading or more active management strategies. One of the most common blockchain investment strategies is long-term holding, which involves purchasing blockchain assets and holding them for an extended period of time, often years or even decades. This strategy is based on the belief that the value of blockchain technology will continue to appreciate over time as adoption increases and new use cases emerge. Long-term holding is often favored by investors who have a high tolerance for risk and are willing to weather the volatility of the blockchain market in exchange for potentially high returns. Another popular blockchain investment strategy is short-term trading, which involves buying and selling blockchain assets on a more frequent basis, often within a matter of days or weeks. This strategy is typically used by investors who are looking to capitalize on short-term market trends or news events. Short-term trading can be a highly lucrative strategy, but it also carries significant risks, as the blockchain market can be highly volatile and unpredictable (Xie, 2020).

A third blockchain investment strategy is active management, which involves actively managing a portfolio of blockchain assets in an attempt to outperform the market. This strategy may involve a combination of long-term holding and short-term trading, as well as other tactics such as diversification, hedging, and leverage. Active management requires a high degree of skill and experience, as well as access to sophisticated trading tools and analytics. Overall, the choice of blockchain investment strategy will depend on several factors, including the investor's risk tolerance, investment horizon, and financial goals. It is important for investors to carefully consider their options and to consult with a financial advisor before making any investment decisions in the blockchain market. Additionally, investors should be aware of the various risks associated with blockchain investing, including market risk, regulatory risk, and technological risk, and should take steps to manage these risks through diversification and other risk management strategies (Deng, 2021).

3.2.4 Risk Management

Investing in blockchain technology carries with it a variety of risks that investors must consider when making investment decisions. One of the main risks is market risk, which refers to the possibility of the value of blockchain-based assets declining due to changes in market conditions such as shifts in demand, supply, and general economic conditions. In addition, the market risk of blockchain investments may be affected by changes in global

monetary policies, political instability, and social factors such as public perception of cryptocurrencies. Another risk associated with blockchain investing is regulatory risk, which refers to the possibility that government regulations or legal frameworks may change, leading to negative impacts on blockchain investments. Blockchain technology, including cryptocurrencies, is a relatively new and rapidly evolving field, and regulatory frameworks have not yet been fully developed. Governments may take steps to regulate the use of cryptocurrencies or blockchain technology, which could negatively impact the value of investments in this area (Kim, 2018).

Furthermore, technological risk is a major concern when investing in blockchain technology. Blockchain-based systems are complex, and there is always the possibility of technical failures or cyber attacks, which can result in the loss of valuable digital assets. The security of blockchain networks depends on complex cryptographic algorithms and decentralized consensus mechanisms, which can be difficult to fully understand and assess. This poses a significant challenge to investors who must weigh the potential benefits of blockchain technology against the risks inherent in investing in such a nascent and complex field. To mitigate these risks, investors in blockchain technology can employ various risk management strategies. There are various risk management strategies that investors can adopt when investing in blockchain technology. The following are some of the common risk management strategies:

1. Diversification: Diversification is one of the most basic risk management strategies. Investors can spread their investment across multiple cryptocurrencies or blockchain projects, rather than investing in just one project or currency. This can help reduce the risk of losing money if one project or currency performs poorly.

2. Due Diligence: Before investing in any blockchain project, investors should conduct thorough due diligence to understand the project's fundamentals, team, and technology. Investors should analyze the project's white paper, review the project's code, and assess the team's credentials to determine the project's potential risks and rewards.

3. Technical analysis: Technical analysis involves analyzing historical price and volume data to identify trends and patterns. Investors can use technical analysis to assess the market sentiment and identify potential buy or sell signals.

4. Fundamental analysis: Fundamental analysis involves analyzing the underlying fundamentals of a blockchain project, including its technology, team, and market potential. This analysis can help investors identify undervalued projects and avoid overvalued ones.

5. Stop-loss orders: Stop-loss orders are automated trades that are triggered when the price of an asset falls below a certain level. Investors can use stop-loss orders to limit their losses in case the market moves against them.

6. Hedging: Hedging involves taking a position in a financial instrument that is inversely correlated to the investment being hedged. For example, an investor can buy put options on a cryptocurrency to protect against a potential price decline.

7. Insurance: Some insurance companies offer policies that cover losses due to theft, hacks, or other events. Investors can consider purchasing insurance policies to protect against potential losses (Almeida, 2022).

It's important to note that no risk management strategy can completely eliminate the risks associated with blockchain investing. However, by adopting these strategies, investors can better manage their risk exposure and potentially improve their returns over the long term. In summary, investing in blockchain technology carries with it a variety of risks, including market risk, regulatory risk, and technological risk. However, with proper risk management strategies, investors can mitigate these risks and potentially benefit from the exciting opportunities offered by this emerging technology (Almeida, 2022).

3.3 Cryptocurrencies

3.3.1 Overview

Cryptocurrencies are digital assets that use cryptographic techniques to secure financial transactions and control the creation of new units. The concept of cryptocurrencies can be traced back to the late 1990s, but it wasn't until the release of Bitcoin in 2009 that the first decentralized cryptocurrency gained significant attention. Since then, thousands of other cryptocurrencies have emerged, each with unique features and intended use cases.

The market size of cryptocurrencies has grown significantly over the years, with a total market capitalization of over $2 trillion as of 2021 (Watorek, 2021).

Figure 1, market Capitalization of Cryptocurrencies, 2015-22

Market Capitalization of Cryptocurrencies, 2015-22 (USD Billions)
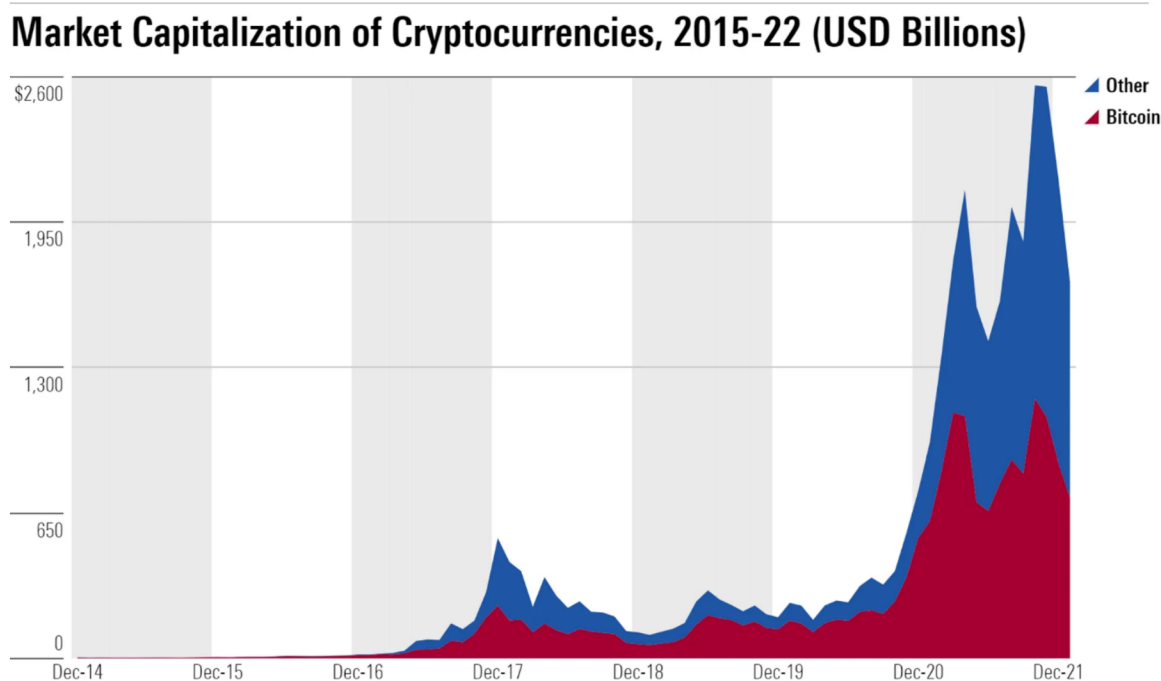
Source: Watorek, 2021

The valuation metrics of cryptocurrencies vary depending on the coin, with factors such as market demand, supply, and adoption rates affecting their prices. Market demand can be influenced by factors such as media coverage, regulatory actions, and the overall sentiment of investors. The history of cryptocurrencies has been marked by significant fluctuations in prices and regulatory challenges. In the early days of Bitcoin, prices were highly volatile, with values fluctuating from a few cents to over $1,000 in just a few years. Regulatory challenges have also been a significant issue for cryptocurrencies, with governments and financial institutions grappling with how to regulate this emerging asset class. Despite the challenges, cryptocurrencies continue to gain popularity as an investment option due to their potential for high returns and diversification benefits. However, the risks associated with investing in cryptocurrencies cannot be ignored, including market volatility, regulatory uncertainty, and security concerns. It is essential for investors to understand these risks and develop appropriate risk management strategies to protect their investments (Taskinsoy, 2020).

3.3.2 Altcoins

Since the emergence of Bitcoin in 2009, alternative cryptocurrencies, or altcoins, have been introduced. Altcoins are digital currencies that differ from Bitcoin in their rules, algorithms, and protocols. The first altcoin, Namecoin, was introduced in 2011, and since then, numerous altcoins have been introduced, each with its own features and use cases. Litecoin, introduced in 2011, was designed to be a faster and cheaper alternative to Bitcoin. Ripple, introduced in 2012, was designed to enable near-instantaneous cross-border payments. Ethereum, introduced in 2015, introduced smart contracts that enable the creation of decentralized applications. Altcoins have both advantages and disadvantages. Altcoins provide an opportunity for investors to diversify their portfolios, reduce their exposure to Bitcoin, and spread their investments across multiple cryptocurrencies. Altcoins are often created to solve specific problems or provide new features that are not available in Bitcoin, promoting innovation. Some altcoins, such as Litecoin and Bitcoin Cash, have faster transaction speeds than Bitcoin, making them more suitable for everyday transactions. However, altcoins are still struggling to gain mainstream adoption, making them more volatile and riskier investments than Bitcoin. Altcoins often have lower trading volumes than Bitcoin, making them more difficult to buy and sell. Additionally, altcoins are not as well-known as Bitcoin, making them more vulnerable to fraud and scams (Nguyen, 2019).

Polkadot is one of the most promising altcoins, designed by Gavin Wood, one of the co-founders of Ethereum. Polkadot is built on its own blockchain and uses a unique consensus mechanism called Nominated Proof of Stake (NPoS) to improve the security and scalability of the network. Token holders nominate validators responsible for validating transactions on the network. Polkadot's key advantage is its ability to enable interoperability between different blockchains. This means that Polkadot can connect different blockchains, enabling them to communicate and share information, improving the overall efficiency and functionality of the blockchain ecosystem. In conclusion, altcoins have emerged as an alternative to Bitcoin, offering investors a variety of options with different features and use cases. Polkadot is one of the most promising altcoins, with its unique consensus mechanism and ability to connect different blockchains, making it a significant player in the blockchain ecosystem. Investors must carefully consider the advantages and disadvantages of altcoins before investing in them (Abbas, 2022).

3.3.3 Major Players

Cryptocurrencies have captured the attention of investors and the public alike due to their volatile and sometimes astronomical price movements. Bitcoin is the most well-known and valuable cryptocurrency, having been introduced in 2009. Its value has seen unprecedented growth over the years, reaching a high of nearly $65,000 in April 2021, before experiencing a significant decline. Ethereum is another major cryptocurrency that has gained popularity among investors and developers alike. Ethereum is known for its smart contract functionality, which allows developers to build decentralized applications on top of its blockchain. Its value has also experienced significant growth, reaching an all-time high of over $4,300 in May 2021. Other major cryptocurrencies include Binance Coin, Dogecoin, and Cardano, each with their unique features and use cases. These cryptocurrencies have seen tremendous growth in recent years, with Binance Coin, for example, having increased in value by over 1000% in 2021 alone. The analysis of major cryptocurrencies is complex and multifaceted, involving technical, economic, and social factors. The technical factors include the design of the cryptocurrency's underlying blockchain technology, the level of adoption and usage, and the scalability of the network. Economic factors include market demand, supply, and price fluctuations, while social factors may include the level of community engagement, regulatory environment, and media coverage (Rubbaniy, 2022).

Figure 2, market shares

Source: Rubbaniy, 2022

26
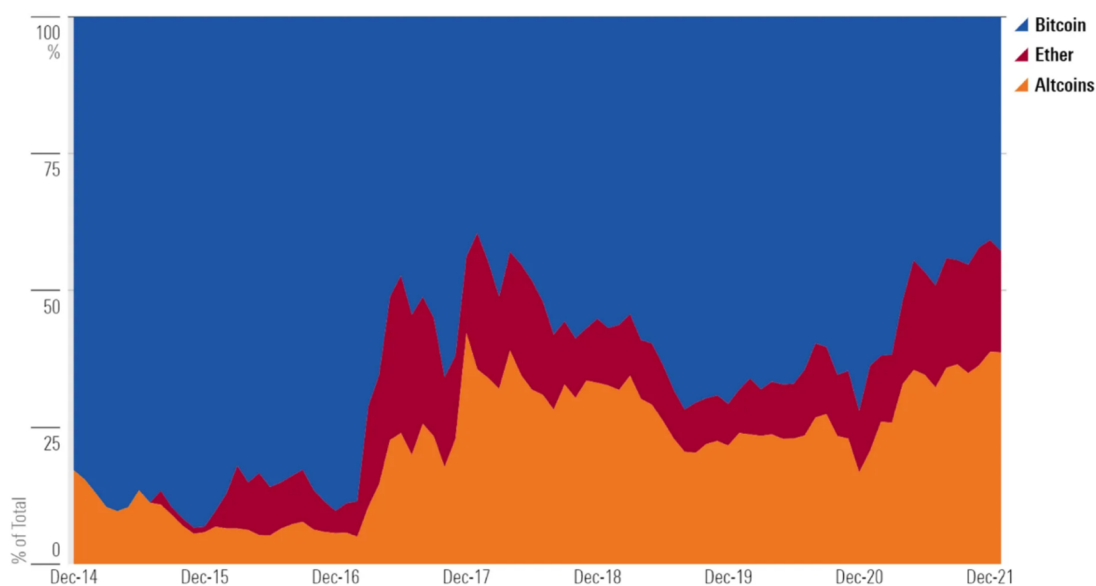
The rise and fall of major cryptocurrencies can often be attributed to a combination of these factors. For instance, in early 2021, the market value of cryptocurrencies soared due to high demand from institutional investors and companies such as Tesla, who announced their purchase of Bitcoin. However, regulatory concerns, such as the Chinese government's crackdown on cryptocurrency mining and trading, led to a significant decline in cryptocurrency prices in the following months. It is worth noting that the analysis of major cryptocurrencies is subject to high volatility and uncertainty, with sudden price fluctuations and changes in market sentiment being common. As such, investors should exercise caution and undertake careful research before making any investment decisions (Rubbaniy, 2022).

3.3.4   Trends

Blockchain investment has witnessed several trends and developments that are reshaping the industry, and one of the most notable trends is the rise of decentralized finance (DeFi). DeFi is a blockchain-based financial system that provides users with access to financial services, without the need for intermediaries like banks. It operates on a peer-to-peer network that is secured by smart contracts and cryptographic algorithms. DeFi platforms offer a range of financial services, including lending, borrowing, staking, and trading, among others. One of the main advantages of DeFi is that it eliminates the need for intermediaries, which leads to lower fees, faster transaction times, and greater transparency. Additionally, DeFi provides users with more control over their assets, as they are not held by a centralized authority. As a result, DeFi has gained significant popularity among investors and traders, with the total value locked in DeFi protocols surpassing $90 billion in early 2022. Another trend in blockchain investment is the growth of non-fungible tokens (NFTs), which are unique digital assets that are secured by blockchain technology. NFTs are used to represent a wide range of assets, including art, music, and virtual real estate. The popularity of NFTs has surged in recent years, with several high-profile sales generating millions of dollars in revenue. This has led to a growing interest in NFTs as an investment opportunity, with some investors viewing them as a potential store of value. Initial coin offerings (ICOs) and initial decentralized offerings (IDOs) are another trend in blockchain investment. These are fundraising methods that allow blockchain-based startups to raise capital by issuing digital tokens to investors. ICOs and IDOs have gained popularity due to their potential for high returns, but they also carry significant risks, including the potential

for fraud and regulatory uncertainty. Finally, staking is another trend in blockchain investment, whereby users hold and lock up their tokens to support the security and operations of a blockchain network. In return, stakers receive rewards in the form of additional tokens. Staking has gained popularity due to its potential for passive income and the ability to support the growth and security of blockchain networks. In conclusion, the trends in blockchain investment, such as the rise of DeFi and NFTs, as well as the growth of ICOs, IDOs, and staking, are reshaping the investment landscape and providing new opportunities for investors. However, these trends also carry significant risks, and investors must carefully consider the potential risks and rewards before investing in blockchain assets (Corbet, 2022).

3.4 Future Prospects

3.4.1 Predictions for Future

Blockchain technology has been rapidly evolving since its inception, and there is great potential for further development in the future. One area of focus for the future of blockchain technology is scalability, which refers to the ability of a blockchain system to process a high volume of transactions without slowing down or becoming congested. Current blockchain systems, such as Bitcoin and Ethereum, have struggled with scalability issues, which have limited their adoption in mainstream applications. To address this issue, there are several proposals for scaling solutions, such as sharding, sidechains, and off-chain transactions, that could potentially increase the capacity of blockchain systems. Another area of potential development for blockchain technology is interoperability, which refers to the ability of different blockchain networks to communicate and exchange data with one another. Currently, there are many different blockchain networks that operate independently, which limits their potential to interact with one another. Interoperability could enable greater connectivity between different blockchain networks and enable the creation of more complex applications and use cases (Selgin, 2022).

Security is also a major concern for blockchain technology, and future advancements in security are expected to play a significant role in the evolution of the industry. As the value of blockchain-based assets grows, there is a greater risk of hacks and other security breaches.

Advancements in security protocols, such as multi-party computation and zero-knowledge proofs, could improve the security of blockchain systems and enhance their adoption in more high-risk applications. In addition to these technical advancements, there are also many potential developments in the regulatory landscape that could impact the future of blockchain technology. The emergence of regulatory frameworks for blockchain-based assets and the increasing interest from institutional investors could lead to greater adoption and investment in the industry. Overall, the future of blockchain technology is full of potential for further development and innovation. Advancements in scalability, interoperability, and security could lead to greater adoption of blockchain-based applications, while regulatory developments and institutional investment could further legitimize the industry. It is important for investors to stay informed about these potential developments and their implications for investment in the blockchain industry (Yu, 2022).

3.4.2 Implications for Investment

Blockchain technology has shown promising growth in recent years, and its potential for future development could lead to significant implications for investment in the industry. The advancement in scalability, interoperability, and security could make blockchain technology more practical, efficient, and accessible for businesses, which could lead to increased adoption and investment. Scalability has been a long-standing challenge for blockchain technology, as it limits the number of transactions that can be processed at a given time. However, the development of new scaling solutions, such as sharding and sidechains, could address this issue and allow for more transactions to be processed at a faster rate. This could open up new use cases for blockchain technology, particularly in industries that require high transaction volume, such as finance, healthcare, and supply chain management. Interoperability, or the ability for different blockchain networks to communicate with each other, is another area of development that could have significant implications for investment. Interoperability would allow for seamless transfer of data and assets between different blockchain networks, which could create new opportunities for collaboration and innovation. This could also increase the liquidity of blockchain-based assets and create new investment opportunities. Security is a critical factor in the success of blockchain technology, and any developments in this area could have a significant impact on investment. Blockchain technology is often touted for its inherent security due to its decentralized and immutable nature, but there have been instances of security breaches, such

as the 2016 DAO hack. The development of new security solutions, such as advanced encryption methods and multi-party computation, could enhance the security of blockchain networks and make them more attractive to investors. Overall, the potential future developments of blockchain technology could have significant implications for investment in the industry. Scalability, interoperability, and security are key areas of development that could create new opportunities for collaboration, innovation, and investment. As blockchain technology continues to evolve, investors will need to stay informed about new developments and adapt their strategies accordingly to capitalize on potential opportunities (Ilham, 2022).

3.4.3 Potential Risks

As blockchain technology continues to evolve, it presents both risks and opportunities for investors in the industry. One of the main risks is the possibility of regulatory intervention, as governments around the world continue to grapple with how to regulate cryptocurrencies and other blockchain-based assets. As the industry becomes more mainstream, it may also face increased scrutiny from regulators, which could lead to more stringent reporting requirements, restrictions on trading, and other measures that could negatively impact investment returns. Another risk is the potential for technological obsolescence, as newer and more advanced blockchain technologies emerge that render older ones obsolete. This could lead to losses for investors who have invested in outdated blockchain technologies or projects that fail to keep up with technological advancements. On the other hand, there are also significant opportunities for investors in the blockchain industry. One of the main opportunities is the potential for significant returns on investment, as blockchain technology continues to disrupt traditional industries and create new business models. Investors who are able to identify promising blockchain projects early on and invest in them could see significant gains as those projects grow and mature. Another opportunity is the potential for increased efficiency and transparency in a wide range of industries, as blockchain technology is adopted more widely. For example, blockchain-based supply chain management systems could significantly reduce fraud and increase transparency in global supply chains, while blockchain-based identity management systems could greatly improve the security and privacy of personal data. In addition, the rise of decentralized finance (DeFi) and other blockchain-based financial services presents a significant opportunity for investors. As more financial services are developed on blockchain platforms, there will be

increased demand for tokens and other blockchain-based assets, creating new investment opportunities. Overall, while there are significant risks associated with blockchain investing, there are also significant opportunities for investors who are able to navigate the rapidly evolving landscape of the blockchain industry. By staying informed about the latest developments in blockchain technology and carefully evaluating investment opportunities, investors can position themselves to take advantage of the potential upside of this exciting new industry (Jalan, 2023).

4 Practical Part

4.1 Trend Analysis

For his analysis, the author considers the time series dataset that was originally extracted from Yahoo finance, and which is indicated in Table X available below.

Table 1, dataset from Yahoo Finance

Day	Polkadot, 1 coin for USD	Ethereum, 1 coin for USD	Google, 1 stock to USD	Amazon, 1 stock to USD
April	14.519939	2730.18677	114.966499	124.281502
May	10.366197	1942.328	114.039001	120.209503
June	7.039863	1067.29883	109.372498	106.209999
July	8.645671	1681.51733	116.639999	134.949997
August	7.026895	1553.68494	109.150002	126.769997
September	6.31519	1327.97864	96.150002	113
October	6.630904	1572.71448	94.660004	102.440002
November	5.472572	1295.6886	101.449997	96.540001
December	4.314823	1196.77124	88.730003	84
January	6.264369	1586.5354	99.870003	103.129997
February	6.344936	1605.89514	90.300003	94.230003
March	6.033932	1569.1676	94.019997	94.900002

Source: Yahoo Finance, 2023

Consequently, the author first proceeds to the trend analysis of each investment option, which will be analyzed separately using MS Excel. First, the author starts with Polkadot, whose development over the course of the last year according to monthly time series is indicated in Figure X below.

Figure 3, Polkadot trend analysis

Polkadot, 1 coin for USD

$y = -0.5628x + 11.073$
$R^2 = 0.5621$
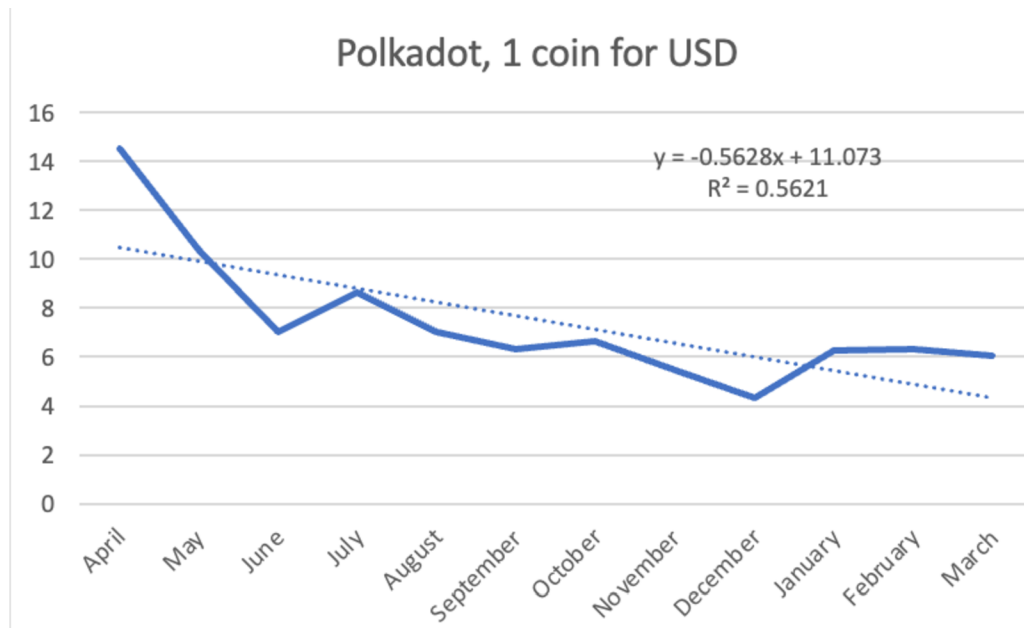
Source: own processing based on Yahoo Finance

Based on the trend, it can be said that the tendency of Polkadot is pessimistic as the price of the coin was rapidly diminishing over the course of the last year from 14.51 to 6 USD per coin, which is more than 2 times decrease over the course of one year. According to the trend estimation, it can be said that each month, the price of of the asset was decreasing by 0.48 USD, which is not a good result. Then, the author proceeds to the price of the second crypto asset – Ethereum, the development of which in time is available in Figure X.

Figure 4, Ethereum trend analysis

Ethereum, 1 coin for USD

$y = -52.858x + 1937.7$
$R^2 = 0.198$
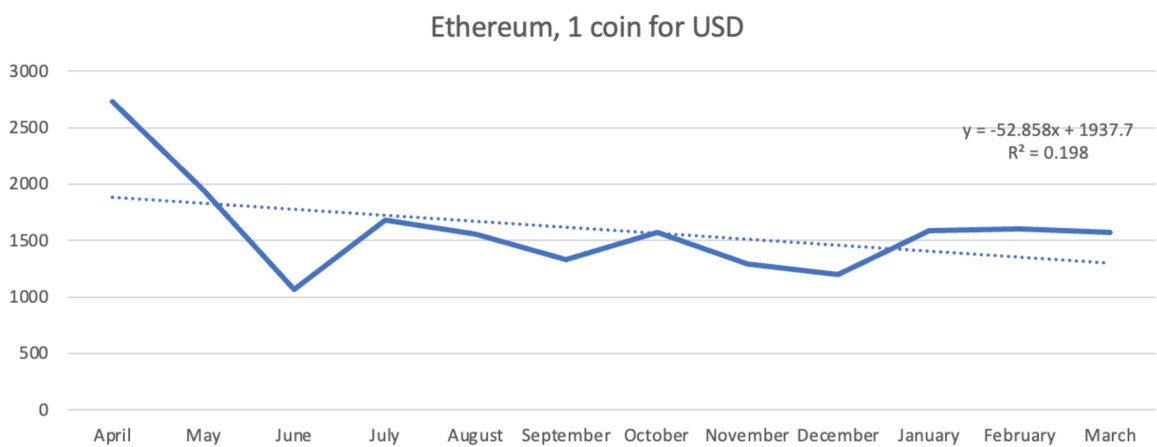
Source: own processing based on Yahoo Finance

More or less identical dynamic is observed in the development of Ethereum over time – the price of the crypto asset was rapidly diminishing, and this diminishment is equal to

42.319 per period according to the trend analysis from Figure X. Clearly, the situation is rather similar to Polkadot, but this is explained by the fact that they both are altcoins and their development is strongly related to the general to all possible fluctuations in the price of Bitcoin.

Then, after focusing on crypto assets, the author proceeds to the analysis of Google and amazon stocks, whose development in time is indicated on the same figure – Figure X, which is indicated below.

Figure 5, Google and Amazon trend analysis
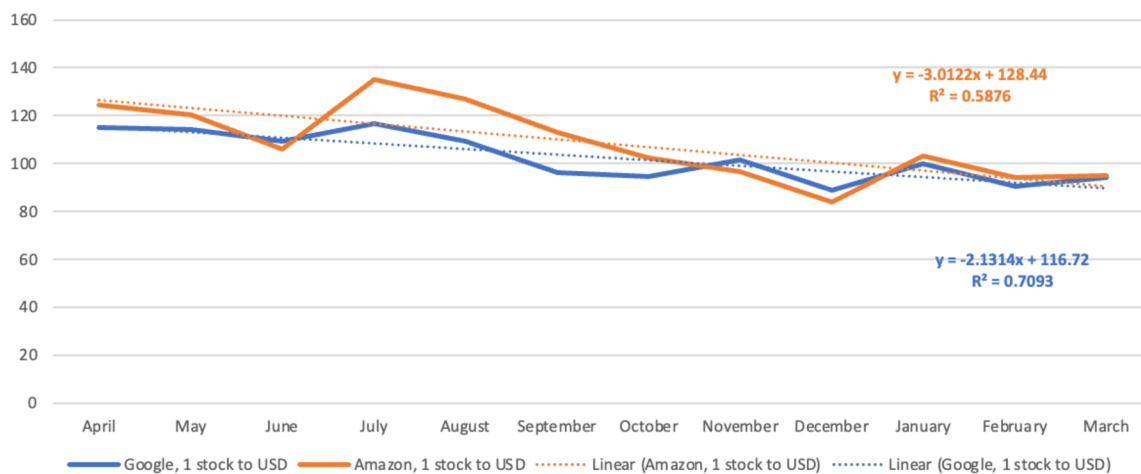
Source: own processing based on Yahoo Finance

Consequently, when it comes to the second pair – the dynamic is quite identical with a constant diminishing in the price of assets, where the price of Amazon as decreasing monthly by 3.01 USD per one stock, while the price of Google was diminishing monthly by 2.13 USD per one stock. Overall, it can be assumed based on the trend analysis that both crypto assets and ordinary stocks are going through the stage of the bear market or they are in the bearish stage, which is a good and bad sign at the time.

4.2 Volatility Analysis

Then, after focusing on the trend analysis, the author continues to the volatility analysis, where volatility per each kind of investment is quantified with the help of the formulas (2) and (3), standard deviation and coefficient of variation, respectively. For this purpose, the

34

author creates a new table where he applied the aforementioned formulas and the results of the calculation is indicated in Table X available below.

Table 2, volatility analysis

	Polkadot, 1 coin for USD	Ethereum, 1 coin for USD	Google, 1 stock to USD	Amazon, 1 stock to USD
Standard Deviation	2.70	428.29	10.0004	15.49
Coefficient of variation	37%	27%	10%	14%

Source: own processing based on Yahoo Finance

Based on the assessment of volatility, it can be surely said that the riskiest asset out of all is Polkadot, followed by Ethereum. Amazon and Google have quite similar level of volatility with 14% and 10%, respectively. Clearly, based on the results of the volatility analysis, it can be said that crypto assets are indeed more volatile and riskier than ordinary stocks. Yet, based on the fact that the level of quite similar, it suggests that the situation for the stock market is not good as the level of risk is usually lower than 10%, so the situation is atypical, which might be explained by the instability on the international arena and also the period of historically high interest rates imposed by the governments all over the world and the American one in particular.

4.3 Correlation Analysis

For the correlation analysis, the author conducts this analysis based on two fundamental assumptions: altcoins are highly correlated with Bitcoin, so the author verifies the correlation of Bitcoin with the bunch of crypto assets selected for the analysis; Google and Amazon are parts of the stock market, so raising interest rates has an inevitable effect on the stock market, so the author computes the correlation between the interest rate and selected stocks. Ultimately, the author combines two ideas and calculates correlation of bitcoin with stocks and interest rate of the US with crypto assets. Table X contains the input for the analysis.

Table 3, dataset for the correlation analysis

Day	Polkadot, 1 coin for USD	Ethereum, 1 coin for USD	Google, 1 stock to USD	Amazon, 1 stock to USD	Bitcoin, 1 coin for USD	Interest rate, %
April	14.519939	2730.18677	114.966499	124.281502	37714.875	0.33
May	10.366197	1942.328	114.039001	120.209503	31792.31055	0.77
June	7.039863	1067.29883	109.372498	106.209999	19784.72656	1.21
July	8.645671	1681.51733	116.639999	134.949997	23336.89648	1.68
August	7.026895	1553.68494	109.150002	126.769997	20049.76367	2.33
September	6.31519	1327.97864	96.150002	113	19431.78906	2.56
October	6.630904	1572.71448	94.660004	102.440002	20495.77344	3.08
November	5.472572	1295.6886	101.449997	96.540001	17168.56641	3.78
December	4.314823	1196.77124	88.730003	84	16547.49609	4.10
January	6.264369	1586.5354	99.870003	103.129997	23139.2832	4.33
February	6.344936	1605.89514	90.300003	94.230003	23147.35352	4.57
March	6.033932	1569.1676	94.019997	94.900002	22362.67969	4.65

Source: own processing based on Yahoo Finance

Consequently, based on the input data, the author proceeds to the calculation of Pearson correlation coefficients for each case according to formula (4) from this bachelor thesis' methodology using MS Excel. The correlation matrix is indicated in Table X below.

Table 4, correlation matrix

	Polkadot, 1 coin for USD	Ethereum, 1 coin for USD	Google, 1 stock to USD	Amazon, 1 stock to USD
Bitcoin, 1 coin for USD	0.94	0.94	0.58	0.51
Interest rate, US	-0.79	-0.49	-0.86	-0.77

Source: own processing based on Yahoo Finance

Then, based on the results of the computation, the author proceeds to the hypothesis testing and the computation of t ratios for each pair. Critical t value for this case is equal to 2.22, so whenever the value from the Table X indicated below for a given pair is lower than this number, this means that the correlation coefficient is not significant, while a value above 2.22 indicates that the correlation of a given pair is high, so variables are related to each other.

Table 5, t-values for correlation coefficients

	Polkadot, 1 coin for USD	Ethereum, 1 coin for USD	Google, 1 stock to USD	Amazon, 1 stock to USD
Bitcoin, 1 coin for USD	8.99	8.64	2.25	1.88
Interest rate, US	-4.12	-1.78	-5.31	-3.86

Source: own processing based on Yahoo Finance

Based on the hypothesis testing, it can be said that there were only two pairs for which the correlation was not significant, and these are Amazon and Bitcoin and Interest rate of the US and Ethereum. Consequently, the author creates a visual representation of the situation and proceeds to the interpretation based on Figure X indicated below.

Figure 6, visual representation of the correlation analysis
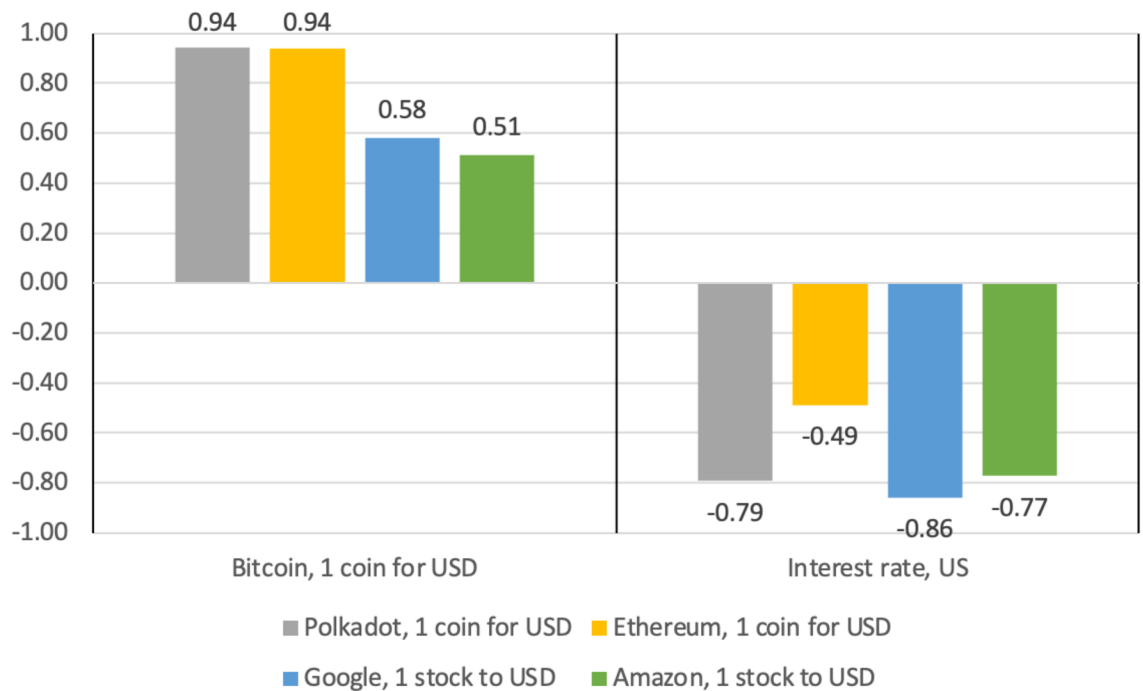
Source: own processing based on Yahoo Finance

Based on Figure X, it is visible that the relationship between all variables – both crypto assets and traditional stocks is positive. However, it is visible that whenever the price of bitcoin rises, the increase in the price of altcoins is incredibly high, while the effect on ordinary stocks is lower and it is primarily associated with the fact that bull stages in both crypto and ordinary stock markets usually coincide, so the author believes that there is in

fact no real relationship between the price of bitcoin and the price of ordinary stocks as they belong to completely different domains.

Then, continuing to the effect of interest rate on stocks and cryptocurrencies, it is possible to say that the relationship between the interest rate in the US and cryptocurrencies with stocks is negative and for the majority of observations, this relationship is significant and strong, which suggest that interest rate increase equally influence cryptocurrencies and stocks.

5 Results and Discussion

5.1 Comparative Analysis

Before proceeding to the detailed comparison of investment options and deciding on which one is the best in the short and long-term perspectives, the author believes that it is wise to recall some of his most important findings. For this purpose, he focuses on the creation a table with the summary for his analysis from the practical part, which is indicated in Table X available below.

Table 6, summary of results

Indicator	Ethereum	Polkadot	Google	Amazon
Correlation with interest rate	Low negative	High negative	High negative	High negative
Correlation with Bitcoin	High positive	High positive	Low positive	Low positive
Volatility	High	High	Low	Average
Previous performance	Diminishing	Diminishing	Diminishing	Diminishing
Tendency	Bearish	Bearish	Bearish	Bearish

Source: own research

Clearly, based on the results obtained by the author, the current market situation for the selected stocks and also for altcoins in general is far from being classified as favorable. Yet, the author managed to find a perfect explanation for the current bearish trend – when it comes to cryptocurrencies, the major drawback in the prices of altcoins is explained by the ongoing recession in the crypto market and notable in Bitcoin, which is explained by the series of major shocks that happened in 2021-2022, such as the crash of Luna and FTX collapse, which both negatively influenced the price of Bitcoin. Consequently, as the author revealed it in his correlation analysis, altcoins are in fact strongly positively correlated with the price of Bitcoin and this was the most important factor leading to the decrease in the capitalization of the market and the fall of author altcoins as well, as there are usually no outliers in the crypto market. When it comes to ordinary stocks, one of the most crucial factors that created the bearish situation on the stock market was the war in Ukraine and the

economic crisis that followed the war, which eventually lead to the situation with historically high interest rates, especially in the US, the rate of which has a direct implication on the capitalization of crypto market, as the author's analysis revealed it. In fact, the stock market, according to the correlation analysis conducted by the author is not the only market being affected by historically high interest rates – crypto market is also negatively correlated with interest rates, so the situation with uncertainty in the world economy also prevented the crypto market from improving its stance and finally breaking the bearish cycle. The author's findings regarding the effect of interest rates on stock markets coincide with the findings of Alam (2009), who believes that periods of high interest rates help investors to increase their gains due to the fact that interest rates are negatively correlated with the prices of stocks listed on markets. When it comes to the author's results about the negative effect of interest rates on cryptocurrencies, the author does not coincide in his findings with Kusamastuty (2019), who suggested that crypto variables are not statistically related to interest rates.

When it comes to volatility, it is wise to say that due to the bearish situation on the stock exchange markets, the volatility of stocks is historically high when considering the period of the last year, so in this case, it is possible to conclude that the level of volatility is somewhat similar between cryptocurrencies and ordinary stocks with a significant presence of the risk. At the same time, the author believes that the situation with the stock market is significantly more predictable and as the interest rates will be lowered around the world and the war will finish, the market will stabilize and the bearish tendency will be replaced by a bullish one, while it is not all all certain whether crypto currencies and in particular, Bitcoin will be able to recover from the series of enormous shocks and pain inflicted by the collapse of the FTX and the crash of Luna as also concluded by Schulp (2022).

5.2 Recommendations

Based on the series of findings and relationships identified by the author, he believes that he can surely provide a recommendation for investors considering either of four selected options for his analysis. Thus, it is wise to say that the situation on the stock exchange market can be at least predicted to some extent because it is pretty apparent that the market will recover once high interest rates are removed, while the situation with cryptocurrencies is growing more and more uncertain even in relation to the crypto market's biggest asset – Bitcoin. Therefore, the author believes that this bearish situation on the market offers a

perfect opportunity for investors to maximize their gains by investing not into the crypto market but into the stock market as based on the dynamic and generally the author's analysis, it is not at all likely that the capitalization of the market will go even lower – the same applies to the prices of selected stocks, while the situation for cryptocurrencies is growing more and more concerning as the market is not able to fully recover after the series of shocks, so it is really dubious how will this young market be able to bear new challenges.

The author suggests that by investing in the long-term horizon into the stock market, investors will not lose their money as the prices will not go lower and gains will start to appear as the world economy is projected to break the grip of the ongoing economic recession, which is expected to happen within one or two years. For the short-term investing recommendation, the author believes that there is no way for investors to maximize their gains in such an unstable economic situation with companies laying off their employees – especially Google and Amazon. Therefore, the author believes that the best strategy for now is the long-term one with potential return happening no earlier than the year 2024.

6 Conclusion

To conclude, the author is able to highlight that when comparing potential investments to crypto currencies and stocks, the author, based on the example of the comparative analysis of Polkadot/Ethereum coins and Google/Amazon stocks is able to say that the second option is more preferred due to lower volatility and higher predictability of the market. At the same time, the author believes that the current financial situation is rather complicated and there are almost no ways for investors to maximize their gains in the short-term perspective by investing into major enterprises' stocks in 2023. However, as the situation with interest rates will be improved and those rates will be lowered, the price of stocks will surge and investors who would have had invested into stocks in 2023 might experience the first gains in the long-term perspective no earlier than in 2024, which is still a decent prospect, especially when comparing it to the obscure situation in the crypto market, which still have not recovered from the series of shocks from 2021-2022 and it is entirely uncertain whether this market will recover at all.

In addition to that, the author believes that investing into different tools and mechanism is a much better idea for investors looking to maximize their returns in the short-term perspective. One of such examples might be the market of commodities and the Forex, since the unstable situation in the world created many opportunities for investors by disrupting basic and traditional tendencies.

7   References

Abbas, H., Caprolu, M., & Di Pietro, R. (2022). Analysis of polkadot: Architecture, internals, and contradictions. In *2022 IEEE International Conference on Blockchain (Blockchain)* (pp. 61-70). IEEE.

Akhmatov, V., & Roienko, L. V. (2020). History and modernity of cryptocurrencies. In *Вітчизняна наука на зламі епох: проблеми та перспективи розвитку*. Університет Григорія Сковороди в Переяславі.

Alam, M. D., & Uddin, G. (2009). Relationship between interest rate and stock price: empirical evidence from developed and developing countries. *International Journal of Business and Management (ISSN 1833-3850), 4*(3), 43-51.

Almeida, J., & Gonçalves, T. C. (2022). A systematic literature review of volatility and risk management on cryptocurrency investment: A methodological point of view. *Risks, 10*(5), 107.

ARIKAN, N. İ. (2020). an Overview of the cryptocurrencies; the theory of money perspective. *Malatya Turgut Özal Üniversitesi İşletme ve Yönetim Bilimleri Dergisi, 1*(2), 147-165.

Baliga, A. (2016). The blockchain landscape. *Persistent Systems, 3*(5), 4.

Bansal, G., Hasija, V., Chamola, V., Kumar, N., & Guizani, M. (2019). Smart stock exchange market: A secure predictive decentralized model. In *2019 IEEE Global Communications Conference (GLOBECOM)* (pp. 1-6). IEEE.

Carpentier, C., L'her, J. F., & Suret, J. M. (2010). Stock exchange markets for new ventures. *Journal of Business Venturing, 25*(4), 403-422.

Choo, K. K. R., Ozcan, S., Dehghantanha, A., & Parizi, R. M. (2020). Blockchain ecosystem—technological and management opportunities and challenges. *IEEE Transactions on Engineering Management, 67*(4), 982-987.

Chuen, D. L. K., Guo, L., & Wang, Y. (2017). Cryptocurrency: A new investment opportunity?. *The journal of alternative investments, 20*(3), 16-40.

Corbet, S., Goodell, J. W., & Günay, S. (2022). What drives DeFi prices? Investigating the effects of investor attention. *Finance Research Letters, 48*, 102883.

Deng, Y., Xu, H., & Wu, J. (2021). Optimization of blockchain investment portfolio under artificial bee colony algorithm. *Journal of Computational and Applied Mathematics, 385,* 113199.

Feinstein, B. D., & Werbach, K. (2021). The impact of cryptocurrency regulation on trading markets. *Journal of Financial Regulation, 7*(1), 48-99.

FRED. (2023). *Federal funds effective rate.* Retrieved March 4, 2023, from https://fred.stlouisfed.org/series/FEDFUNDS

Ilham, R. N., Sadalia, I., Irawati, N., & Sinta, I. (2022). Risk And Return Model of Digital Cryptocurrency Asset Investment In Indonesia. *Al Qalam: Jurnal Ilmiah Keagamaan dan Kemasyarakatan, 16*(1), 357-376.

Jalan, A., & Matkovskyy, R. (2023). Systemic risks in the cryptocurrency market: Evidence from the FTX collapse. *Finance Research Letters,* 103670.

Kim, C. Y., & Lee, K. (2018). Risk management to cryptocurrency exchange and investors guidelines to prevent potential threats. In *2018 international conference on platform technology and service (PlatCon)* (pp. 1-6). IEEE.

Konoth, R. K., Vineti, E., Moonsamy, V., Lindorfer, M., Kruegel, C., Bos, H., & Vigna, G. (2018). Minesweeper: An in-depth look into drive-by cryptocurrency mining and its defense. In *Proceedings of the 2018 ACM SIGSAC Conference on Computer and Communications Security* (pp. 1714-1730).

Kusumastuty, C. A., Wulandari, D., Narmaditya, B. S., & Kamaludin, M. (2019). Do monetary variables affect to cryptocurrency price? Lesson from Indonesia. *Jurnal Ekonomi dan Studi Pembangunan, 11*(2), 131-142.

Mukhopadhyay, U., Skjellum, A., Hambolu, O., Oakley, J., Yu, L., & Brooks, R. (2016). A brief survey of cryptocurrency systems. In *2016 14th annual conference on privacy, sec*

Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). *Bitcoin and cryptocurrency technologies: a comprehensive introduction.* Princeton University Press.

Navamani, T. M. (2023). A review on cryptocurrencies security. *Journal of Applied Security Research, 18*(1), 49-69.

Nguyen, T. V. H., Nguyen, B. T., Nguyen, T. C., & Nguyen, Q. Q. (2019). Bitcoin return: Impacts from the introduction of new altcoins. *Research in International Business and Finance, 48*, 420-425.

Nica, O., Piotrowska, K., & Schenk-Hoppé, K. R. (2022). Cryptocurrencies: Concept and current market structure. In *Cryptofinance: A new currency for a new economy* (pp. 1-28).

Phillip, A., Chan, J. S., & Peiris, S. (2018). A new look at cryptocurrencies. *Economics Letters, 163*, 6-9.

Rubbaniy, G., Tee, K., Iren, P., & Abdennadher, S. (2022). Investors' mood and herd investing: A quantile-on-quantile regression explanation from crypto market. *Finance Research Letters, 47*, 102585.

Schulp, J. J. (2022). Crypto Crash: Why the FTX Bubble Burst and the Harm to Consumers.

Selgin, G. (2022). Bitcoin: Problems and prospects.

Taskinsoy, J. (2020). Bitcoin could be the first cryptocurrency to reach a market capitalization of one trillion dollars. *Available at SSRN 3693765.*

Till, B. M., Peters, A. W., Afshar, S., & Meara, J. G. (2017). From blockchain technology to global health equity: can cryptocurrencies finance universal health coverage?. *BMJ global health, 2*(4), e000570.

Wątorek, M., Drożdż, S., Kwapień, J., Minati, L., Oświęcimka, P., & Stanuszek, M. (2021). Multiscale characteristics of the emerging global cryptocurrency market. *Physics Reports, 901*, 1-82.

Xie, M., Li, H., & Zhao, Y. (2020). Blockchain financial investment based on deep learning network algorithm. *Journal of Computational and Applied Mathematics, 372*, 112723.

Yahoo! (2023). *Alphabet Inc. (GOOG) stock price, news, Quote & History.* Yahoo! Finance. Retrieved March 4, 2023, from https://finance.yahoo.com/quote/GOOG?p=GOOG&.tsrc=fin-srch

Yahoo! (2023). *Amazon.com, inc. (AMZN) stock price, news, Quote & History.* Yahoo! Finance. Retrieved March 4, 2023, from https://finance.yahoo.com/quote/AMZN?p=AMZN&.tsrc=fin-srch

Yahoo! (2023). *Bitcoin USD (BTC-USD) price, value, news & history*. Yahoo! Finance. Retrieved March 4, 2023, from https://finance.yahoo.com/quote/BTC-USD?p=BTC-USD&.tsrc=fin-srch

Yahoo! (2023). Ethereum USD (ETH-USD) price, value, news & history. Yahoo! Finance. Retrieved March 4, 2023, from https://finance.yahoo.com/quote/ETH-USD?p=ETH-USD&.tsrc=fin-srch

Yahoo! (2023). *Polkadot USD (dot-USD) price, value, news & history*. Yahoo! Finance. Retrieved March 4, 2023, from https://finance.yahoo.com/quote/DOT-USD/

Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where is current research on blockchain technology?—a systematic review. *PloS one*, *11*(10), e0163477.

Yu, C., Yang, W., Xie, F., & He, J. (2022). Technology and Security Analysis of Cryptocurrency Based on Blockchain. *Complexity, 2022*.